Claims

[c1] Electromagnetic propulsion devices comprising:
a barrel; and
a cavity in said barrel which extends the length of the barrel with a breach end opening at one barrel end and a muzzle end opening at the second barrel end and throughout its length said cavity has uniform right cross sections to its central axis; and
armatures, in or for insertion into the breach end of the barrel cavity and propulsion through the barrel cavity towards and out of the cavity muzzle end,
and an armature for the device has a central axis that when in the barrel cavity that is close and parallel or coincident with the barrel cavity central axis, and
all right sections taken to its central axis smaller then all barrel cavity right sections and
a portion of said armature sections are similar to the barrel cavity right sections in shape and slightly undersized thereof to permit unobstructed traverse of the barrel cavity by said armature;
two barrel rails which are:
power rails located in the walls of the barrel cavity, oriented parallel the cavity central axis, located across the

barrel cavity from each other, and
each said power rail has:
a connection means at its breach end for attachment of outside circuitry to an outside power source,
a continuous surface its length that is part of the barrel cavity surface and which extends the length of the barrel cavity through which an armature uses said power rail for propulsion in the device, and
said barrel power rails divide the barrel cavity wall into two segments whose barrel cavity surface boundaries are the barrel cavity surfaces of the power rails and cavity axis parallel rays therefrom and the muzzle and breach end boundaries of the barrel cavity,
said power rail axis parallel rays extend towards the breach to the cavity right section plane through the point on the barrel rail cavity surface that is functional in the device and closest the barrel end with the breach
and the intercept lines of said right section plane with the barrel cavity walls are the cavity breach end boundary,
said power rail axis parallel rays extend towards the muzzle to the cavity right section plane through the point on the barrel rail cavity surface that is functional in the device and closest the barrel end with the muzzle
and the intercept lines of said right section plane with the barrel cavity walls are the cavity muzzle end bound-

ary,
a wall conductor assembly comprised of:
a barrel bus which is located in a barrel cavity wall segment and therein oriented parallel, adjacent, and in close proximity one of the power rails and electrically insulated therefrom and of similar or like length and similar or like location along the barrel cavity length as said power rail,
and
a plurality of equal length parallel wall conductors in the barrel cavity wall segment with the barrel bus
which are separated from each other along the length of the barrel bus and
each said wall conductor is:
at or very near the barrel cavity surface, and
physically and electrically continuous with and perpendicular to the barrel bus, and each said wall conductor:
extends from the barrel bus to close proximity without contact with the wall segment boundary barrel rail distal said barrel bus, and
has, and is electrically continuous with, an electrical contact means located at the barrel cavity distal the barrel bus and proximal said barrel rail distal the barrel bus,
and
beyond the barrel bus each wall conductor is electrically insulated from its surroundings except at its electrical

contact means;
said armatures are further comprised of:
a propulsion bus that, with the armature in the barrel cavity:
is oriented therein to travel in close proximity to the wall conductors of the wall conductor assembly and carry electric current in a direction perpendicular to the cavity axis and the armature direction of cavity traverse and parallel to the wall conductors,
extends from proximal the barrel power rail located distal the wall conductor assembly barrel buss, whereat it has electrical continuity with propulsion bus-aft shunt circuit means, to the cavity wall surface of the power rail proximal said barrel buss where said propulsion bus has continuous electrical continuity with said power rail and with armature movement in the barrel cavity, continuous sliding electrical continuity with said power rail;
and
a forward current shunt that, with the armature in the barrel cavity,
is located forward the armature propulsion bus in the direction of cavity traverse by the armature and proximal the power rail that is located distal the wall assembly barrel bus, and
the forward current shunt has surface in the armature surface proximal the barrel cavity wall with the wall con-

ductor assembly and
said forward shunt surface has continuous electrical continuity with the wall conductor assembly forward wall conductor contact means and, during armature movement in the barrel cavity, said forward shunt surface has continuous sliding electrical continuity with the contact means of forward wall conductor of said assembly, and the forward current shunt, via said surface at forward wall conductor contact means, has continuous electrical continuity with the wall conductor assembly and during armature movement in the barrel cavity said forward shunt, via said surface, has continuous sliding electrical continuity with the wall conductor assembly through its continuous sliding electrical continuity with forward wall conductor contact means as said means are passing across said shunt surface, and
during barrel cavity traverse by the armature, said forward current shunt, via said surface at the surface of the barrel cavity section with the wall conductor assembly, has continuous sliding electrical continuity with the wall conductor assembly from breach to muzzle and said continuity is resultant the continuous sequential sliding electrical continuity said surface has with successive wall conductors, via their contact means, comprising forward wall conductor of the wall conductor assembly as said contact means are passing across said forward current

shunt surface with continuous sliding electrical continuity, as said forward current shunt passes said contact means barrel cavity location, additionally,
the forward current shunt has continuous electrical continuity with the proximal barrel power rail via a surface at the cavity surface of said rail and during armature movement in the barrel cavity the forward current shunt has continuous sliding electrical continuity with said proximal barrel power rail via said shunt surface at the cavity surface of said rail and said forward current shunt thereby maintains continuous electrical continuity between said power rail and forward wall conductor of the wall conductor assembly, and
with an armature in the barrel cavity, said forward armature current shunt, except for its continuous electrical continuity with forward wall conductor and the proximal power rail, is electrically insulated from the rest of the armature and barrel;
and
an aft current shunt which with the armature in the barrel cavity
is located aft the armature propulsion bus in the direction of cavity traverse by the armature and proximal the barrel rail that is located distal the wall assembly barrel bus, and
the aft current shunt has surface in the armature surface

proximal the barrel cavity wall with the wall conductor assembly and

said aft shunt surface has continuous electrical continuity with the wall conductor assembly aft wall conductor contact means and, during armature movement in the barrel cavity said aft shunt surface has continuous sliding electrical continuity with the contact means of aft wall conductor of said assembly, and

the aft current shunt, via said surface at aft wall conductor contact means, has continuous electrical continuity with the wall conductor assembly and during armature movement in the barrel cavity said aft shunt, via said surface, has continuous sliding electrical continuity with the wall conductor assembly through its continuous sliding electrical continuity with aft wall conductor contact means as said means are passing across said shunt surface, and

during barrel cavity traverse by the armature, said aft current shunt, via said surface at the surface of the barrel cavity section with the wall conductor assembly, has continuous sliding electrical continuity with the wall conductor assembly from breach to muzzle and said continuity is resultant the continuous sequential sliding electrical continuity said surface has with successive wall conductors, via their contact means, comprising aft wall conductor of the wall conductor assembly as said contact

means are passing across said aft current shunt surface with continuous sliding electrical continuity, as aft current shunt passes said contact means barrel cavity location,

the claimed device also has:

a propulsion bus-aft shunt circuit means which maintains continuous electrical continuity between the armature aft current shunt and the armature propulsion bus; and

with an armature in the barrel cavity, said armature propulsion bus except for its said electrical continuity with the barrel bus proximal power rail and its said electrical continuity with said propulsion bus-aft shunt circuit means is electrically insulated from the rest of the armature and barrel;

with an armature in the barrel cavity, said armature aft current shunt except for its continuous electrical continuity with aft wall conductor contact means and its electrical continuity with said propulsion bus-aft shunt circuit means is electrically insulated from the rest of the armature and barrel;

and in which with an outside power source attached to the connection means of the two power rails and an armature of the claimed device is in or inserted into the breach end of the barrel cavity where said power rails and wall assembly are extant, the electric current path in

the device effecting electromagnetic propulsion of the armature in the barrel cavity toward the muzzle is extant and remains so while the armature is completely in the barrel cavity where said rails and wall assembly are extant; and the magnetic fields of the electric currents in the barrel rails and forward wall conductor, aft wall conductor and barrel bus of the wall conductor assembly interact with the electric current in the propulsion bus of said armature creating the forces therein with barrel cavity axis parallel, barrel muzzle directed components which propel said armature in the barrel cavity towards the barrel muzzle.

[c2] Combinations as in claim 1 wherein , with an armature in the barrel cavity, the propulsion bus-aft shunt circuit means is comprised of:
an additional barrel rail which is located parallel to and in proximity to the armature shunt proximal power rail, is electrically insulated therefrom, and is of like or similar length and like or similar location along the barrel cavity length as said power rail, and has continuous barrel cavity surface its length,
surface on the aft current shunt which has continuous electrical continuity with barrel cavity surface of said additional barrel rail and during armature movement in the barrel cavity said shunt surface has continuous sliding

electrical continuity with the barrel cavity surface of said additional barrel rail, and
surface on said propulsion bus which has continuous electric continuity with the barrel cavity surface of said additional barrel rail and during armature movement in the barrel cavity said propulsion bus surface has continuous sliding electrical continuity with the barrel cavity surface of said additional barrel rail.

[c3] Combinations as in claim 1 wherein the propulsion bus-aft shunt circuit means is an electric current bus in the armature between and connecting the armature aft current shunt and the armature propulsion bus.

[c4] Combinations as in claim 1 wherein; however: said barrel cavity has a twist so that consecutive barrel cavity right sections when taken at incremental increasing muzzle directed distances from a point at the breach on the cavity axis have like shape and area but have incremental increasing angular displacement about the cavity axis from the initial point and said right cavity section angular displacement per unit axial distance is constant and the barrel cavity thereby imparts a rotation about said axis to an armature of the device traversing said cavity; said armatures of the device and elements therein have structure and surfaces with the same twist about the armature axis as the barrel cavity twist in angle displace-

ment per unit axial distance so as to permit proper function of its various elements while rotating about its axis while moving in the barrel cavity and durng unobstructed traverse of the barrel cavity by said armature while rotating about its axis;
each incremental volume element at their radius to the cavity axis of the sum of the incremental volume elements comprising said barrel rail, the barrel bus and wall conductor of the wall assembly have at their axial location the same angular displacement per unit cavity axis distance;
wall conductors of wall conductor assembles with said twist are no longer perpendicular to the barrel bus of the assembly; however they remain perpendicular to the barrel cavity axis.

[c5] Combinations as in claim 1 but wherein an armature is mounted in the barrel proximal the barrel breach end for release and propulsion in the barrel cavity on application of sufficient power to the power rails.

[c6] Combinations as in claim 1 wherein:
and said wall conductor assembly is the first wall conductor assembly and is located in the first barrel cavity wall segment and
there is additionally:
a second wall conductor assembly which is the mirror

image of said first wall conductor assembly and located in the second wall segment of the barrel cavity and comprised of:

a barrel bus which is located in said second barrel cavity wall segment and therein oriented parallel, adjacent, and in close proximity the power rail adjacent the barrel bus of said first assembly and electrically insulated therefrom and of similar or like length and similar or like location along the barrel cavity length as said power rail, and

a plurality of equal length parallel wall conductors in the second barrel cavity wall segment which are separated from each other in their distribution along the length of the second wall assembly barrel bus and at or very near the second barrel cavity surface,

and each said wall conductor is physically and electrically continuous with and perpendicular to said barrel bus, and

each wall conductor extends in the second barrel cavity wall segment from said barrel bus to close proximity without contact with the barrel rail distal said barrel bus, and

each wall conductor has and is electrically continuous with an electrical contact means located distal the barrel bus, at the barrel cavity, and proximal the barrel bus distal barrel rail, and

beyond the barrel bus each said wall conductor is elec-

trically insulated from its surroundings except at its electrical contact means; and additionally,
the forward current shunt of armatures for the device has a second surface in the second armature surface, which with said armature in the barrel cavity is proximal the second barrel cavity wall containing the second wall conductor assembly and
said forward shunt surface has continuous electrical continuity with the second wall conductor assembly forward wall conductor contact means and, during armature movement in the barrel cavity, said forward shunt surface has continuous sliding electrical continuity with the contact means of forward wall conductor of said second assembly, and
the forward current shunt, via said second surface at said second assembly forward wall conductor contact means, has continuous electrical continuity with the second wall conductor assembly and during armature movement in the barrel cavity said forward shunt, via said surface, has continuous sliding electrical continuity with the second wall conductor assembly through its continuous sliding electrical continuity with second assembly forward wall conductor contact means as said means are passing across said shunt surface, and
during barrel cavity traverse by the armature, said forward current shunt, via said second surface at the sur-

face of the second barrel cavity section and second the wall conductor assembly, has continuous sliding electrical continuity with the second wall conductor assembly from breach to muzzle and said continuity is resultant the continuous sequential sliding electrical continuity said second surface has with successive wall conductors, via their contact means, comprising forward wall conductor of the second wall conductor assembly as said contact means are passing across said forward current shunt second surface with continuous sliding electrical continuity, as said forward current shunt second surface passes said contact means in their second barrel cavity section surface location, additionally,

said forward current shunt maintains continuous electrical continuity between said proximal power rail and the first and second wall conductor assembly forward wall conductor when an armature is in the barrel cavity, has movement in the barrel cavity, or is traversing the barrel cavity and said forward current shunt is otherwise electrically insulated from the rest of the armature and barrel;

additionally, aft current shunt of an armature of the device has a second surface in the armature second surface proximal the second barrel cavity wall and the second wall conductor assembly and said shunt second surface has continuous electrical continuity with the second wall

conductor assembly aft wall conductor contact means and during armature movement in the barrel cavity continuous sliding electrical continuity with the contact means of aft wall conductor of said second assembly, the aft current shunt, via said second surface at second aft wall conductor contact means, has continuous electrical continuity with the second wall conductor assembly and during armature movement in the barrel cavity said aft shunt, via said second surface, has continuous sliding electrical continuity with the second wall conductor assembly through its continuous sliding electrical continuity with second aft wall conductor contact means as said means are passing across said shunt second surface, and during barrel cavity traverse by the armature, said aft current shunt, via said second surface at the surface of the second barrel cavity section and the second wall conductor assembly, has continuous sliding electrical continuity with the second wall conductor assembly from breach to muzzle and said continuity is resultant the continuous sequential sliding electrical continuity said second surface has with successive wall conductors, via their contact means, comprising second aft wall conductor of the second wall conductor assembly as said contact means are passing across said aft current shunt second surface with continuous sliding electrical continuity, as aft current shunt passes said contact means location

at the second barrel cavity section surface,
and said propulsion bus-aft shunt circuit means maintains continuous electrical continuity between aft wall conductor of both the first and second wall conductor assembly and the armature propulsion bus;
and in which with an outside power source attached to the connection means of the two power rails and an armature of the claimed device is in or inserted into the breach end of the barrel cavity of said device where said barrel rails and wall assembles are extant, the electric current path in the device effecting electromagnetic propulsion of the armature in the barrel cavity toward the muzzle is extant and remains so while the armature is completely in the barrel cavity where said rails and wall assembles are extant;
and the magnetic fields of the electric current in the barrel rails and forward wall conductors, aft wall conductors and barrel buses of the wall conductor assembles interact with the electric current in the propulsion bus of the armature creating the forces therein with barrel cavity axis parallel, barrel muzzle directed components which propel said armature in the barrel cavity towards the muzzle.

[c7] Combinations as in claim 6 wherein the propulsion bus-aft shunt circuit means is comprised of:

an additional barrel rail which is located parallel to and in proximity to the armature shunt proximal power rail, is electrically insulated therefrom, and is of like or similar length and like or similar location along the barrel cavity length as said power rail, and has continuous barrel cavity surface its length,
surface on the aft current shunt which has continuous electrical continuity with barrel cavity surface of said additional barrel rail and during armature movement in the barrel cavity said shunt surface has continuous sliding electrical continuity with the barrel cavity surface of said additional barrel rail, and
surface on said propulsion bus which has continuous electric continuity with the barrel cavity surface of said additional barrel rail and during armature movement in the barrel cavity said propulsion bus surface has continuous sliding electrical continuity with the barrel cavity surface of said additional barrel rail.

[c8] Combinations as in claim 6 wherein the propulsion bus-aft shunt circuit means is a electric current bus in the armature between and connecting the armature aft current shunt and the armature propulsion bus.

[c9] Combinations as in claim 6 wherein however:
said barrel cavity has a twist so that consecutive barrel cavity right sections when taken at incremental increas-

ing muzzle directed distances from a point at the breach on the cavity axis have like shape and area but have incremental increasing angular displacement about the cavity axis from the initial point and said right cavity section angular displacement per unit axial distance is constant and the barrel cavity thereby imparts a rotation about said axis to an armature of the device traversing said cavity;

said armatures of the device and elements therein have structure and surfaces with the same twist about the armature axis as the barrel cavity twist in angle displacement per unit axial distance so as to permit proper function of its various elements

while rotating about its axis while moving in the barrel cavity and

during unobstructed traverse of the barrel cavity by said armature while rotating about its axis;

each incremental volume element at their radius to the cavity axis, of the sum of the incremental volume elements comprising said barrel rail, the barrel bus and wall conductors of the wall assembles have at their axial location the same angular displacement per unit cavity axis distance;

wall conductors of wall conductor assembles with said twist are no longer perpendicular to the barrel bus of the assembly; however they remain perpendicular to the

barrel cavity axis.

[c10] Combinations as in claim 6 but wherein an armature is mounted in the barrel proximal the barrel breach end for release and propulsion in the barrel cavity on application of sufficient power to the power rails.

[c11] Combinations as in claim 1 where additionally:
and said wall conductor assembly is the first wall conductor assembly and is located in the first barrel cavity wall segment there is additionally a second wall conductor assembly which is the mirror image of said first wall conductor assembly and located in the second wall segment of the barrel cavity and located in the same segment of barrel length as the first wall conductor assembly and comprised of:
a barrel bus which is located in said second barrel cavity wall segment and therein oriented parallel, adjacent, and in close proximity the power rail adjacent the barrel bus of said first assembly and electrically insulated therefrom and of similar or like length and similar or like location along the barrel cavity length as said power rail,
and a plurality of equal length parallel wall conductors in the second barrel cavity wall segment which are separated from each other in their distribution along the length of the second wall assembly barrel bus and at or very near the second barrel cavity surface, and

each said wall conductor is physically and electrically continuous with and perpendicular to said barrel bus, and each wall conductor extends in the second barrel cavity wall segment from said barrel bus to close proximity without contact with the barrel rail distal said barrel bus, and
each wall conductor has and is electrically continuous with an electrical contact means located distal the barrel bus, at the barrel cavity, and proximal the barrel bus distal barrel rail, and
beyond the barrel bus each said wall conductor is electrically insulated from its surroundings except at its electrical contact means; and additionally,
said forward and aft armature current shunts at said first barrel wall segment are the first forward armature current shunt and first aft armature current shunt, respectively, in armatures for the device, additionally,
said armatures have second forward current shunt and second aft current shunt located in the armature surface proximal the second barrel cavity wall segment and the second wall conductor assembly and
said second forward and aft armature current shunts are located in the same segments of armature axial length as the first forward and aft armature current shunts, respectively,
additionally, with an armature of the device in the barrel

cavity, said first aft current shunt of the armature has continuous electrical continuity with the armature second forward current shunt via aft shunt-forward shunt circuit means

said second aft current shunt of the armature has continuous electrical continuity with the armature propulsion bus via a propulsion bus-aft shunt circuit means and said shunt is otherwise than herein indicated insulated from direct electrical continuity with other elements of the device;

said second armature forward current shunt surface has continuous electrical continuity with forward wall conductor contact means of the second wall conductor assembly when the armature is in the barrel cavity, and continuous sliding electrical continuity with said contact means while the armature has movement in the barrel cavity or is traversing the barrel cavity,

and said second forward current shunt has continuous electrical continuity with the second wall conductor assembly through its continuous electrical continuity with the contact means of said assembly forward wall conductor and said second forward shunt has continuous sliding electrical continuity with said second wall conductor assembly through its continuous sequential sliding electrical contact with successive wall conductors, via their contact means, of second wall conductor assembly

forward wall conductor in the second barrel wall segment from breach to muzzle as said means pass across with sliding electrical continuity said second forward current shunt during armature traverse of the barrel cavity and second forward current shunt crosses over said contact means barrel cavity location,

said second aft current shunt surface has continuous electrical continuity with the contact means of aft wall conductor of the second wall conductor assembly when the armature is in the barrel cavity, and continuous sliding electrical continuity with said contact means while the armature has movement in the barrel cavity or is traversing the barrel cavity, and

said second aft current shunt has continuous electrical continuity with the second wall conductor assembly through its continuous electrical continuity with aft wall conductor contact means of said assembly and continuous sliding electrical continuity with said wall conductor assembly through its continuous sequential sliding electrical contact with successive wall conductors, via their contact means, of second wall conductor assembly aft wall conductor in the second barrel wall segment from breach to muzzle while said means are pass across with sliding electrical continuity said second aft current shunt during armature traverse of the barrel cavity and said second aft current shunt crosses over said contact

means barrel cavity location;
and in which with an outside power source is attached to the connection means of the two power rails and an armature of the claimed device in or inserted into the breach end of the barrel cavity of said device where the barrel rails and wall assembly are extant, the electric current path in the device effecting electromagnetic propulsion of the armature in the barrel cavity toward the muzzle is extant and remains so while the armature is completely in the barrel cavity where said rails and wall assembles are extant;
and the magnetic fields of the electric current in the barrel rails and forward wall conductors, aft wall conductors and barrel buses of the wall conductor assembles interact with the electric current in the propulsion bus of said armature of the device creating forces therein with barrel cavity axis parallel, barrel muzzle directed components which propel said armature in the barrel cavity towards the muzzle.

[c12] Combinations as in claim 11 wherein , with an armature in the barrel cavity, the propulsion bus-aft shunt circuit means is comprised of: an additional barrel rail which is located parallel to and in proximity to the armature shunt proximal power rail, is electrically insulated therefrom, and is of like or similar length and like or similar

location along the barrel cavity length as said power rail, and has continuous barrel cavity surface its length, surface on the second aft current shunt which has continuous electrical continuity with barrel cavity surface of said additional barrel rail and during armature movement in the barrel cavity said shunt surface has continuous sliding electrical continuity with the barrel cavity surface of said additional barrel rail, and surface on said propulsion bus which has continuous electric continuity with the barrel cavity surface of said additional barrel rail and during armature movement in the barrel cavity said propulsion bus surface has continuous sliding electrical continuity with the barrel cavity surface of said additional barrel rail.

[c13] Combinations as in claim 11 wherein with an armature of the device in the barrel cavity the aft shunt-forward shunt circuit means is comprised of:
a barrel rail which is located parallel to and in proximity to the armature shunt proximal power rail and is electrically insulated therefrom and said barrel rail is of like or similar length and like or similar location along the barrel cavity length as said power rail, and has continuous barrel cavity surface its length,
surface on the armature first aft current shunt with continuous electrical continuity with said barrel rail cavity

surface and continuous sliding electrical continuity with said rail cavity surface during armature movement in the barrel cavity, and
surface on the armature second forward current shunt has continuous electrical continuity with said barrel rail cavity surface and continuous sliding electrical continuity with said barrel rail cavity surface during armature movement in the barrel cavity.

[c14] A combination as in claim 11 wherein:
the aft shunt-forward shunt circuit means is an electric bus in the armature which is electrically continuous with both the armature first aft current shunt and the armature second forward current shunt and which is otherwise electrically insulated from direct electrical continuity with other elements of the device.

[c15] A combination as in claim 11 wherein:
the propulsion bus-aft shunt circuit means is an electric bus in the armature which is electrically continuous with both the armature second aft current shunt and the armature propulsion bus at its end proximal said aft current shunt and which is otherwise electrically insulated from direct electrical continuity with other elements of the device.

[c16] Combinations as in claim 11 wherein however:

Combinations as in claim 11 wherein; however: said barrel cavity has a twist so that consecutive barrel cavity right sections when taken at incremental increasing muzzle directed distances from a point at the breach on the cavity axis have like shape and area but have incremental increasing angular displacement about the cavity axis from the initial point and said right cavity section angular displacement per unit axial distance is constant and the barrel cavity thereby imparts a rotation about said axis to an armature of the device traversing said cavity; said armatures of the device and elements therein have structure and surfaces with the same twist about the armature axis as the barrel cavity twist in angle displacement per unit axial distance so as to permit proper function of its various elements while rotating about its axis while moving in the barrel cavity and unobstructed traverse of the barrel cavity by said armature while rotating about its axis; each incremental volume element at their radius to the cavity axis of the sum of the incremental volume elements comprising said barrel rail, the barrel bus and wall conductor of the wall assembly have at their axial location the same angular displacement per unit cavity axis distance; wall conductors of wall conductor assembles with said twist are no longer perpendicular to the barrel bus of the assembly; however they remain perpendicular to the barrel cavity axis.

[c17] Combinations as in claim 11 but wherein an armature is mounted in the barrel proximal the barrel breach end for release and propulsion in the barrel cavity on application of sufficient power to the power rails.

[c18] Combinations as in in claim 11,
wherein when the armature cross section shape and area greatly diminish the forces resultant the magnetic fields of wall conductor electric currents in a centrally located single propulsion bus,
the armature propulsion bus is comprised of 2 electrically insulated branches which diverge from each other and then converge with each other between the propulsion bus-aft shunt circuit means and the propulsion bus electrical continuity with the power rail proximal the wall assembles barrel buses, and
said divergent convergent propulsion bus branches are in the armature surfaces proximal the barrel cavity walls and the wall conductors therein and oriented to keep the propulsion bus current paths in close proximity said wall conductors.

[c19] An electromagnetic propulsion device comprising:
a barrel;
and therein a cavity which extends the length of the barrel with a breach end opening at one end and a muzzle

end opening at the other end and throughout its length said cavity has uniform right cross sections to its central axis;
armatures, in or for insertion into the breach end of the barrel cavity and propulsion through the barrel cavity towards and out of the cavity muzzle end,
and each said armature for the device has a central axis when in the barrel cavity that is close and parallel or coincident with the barrel cavity axis and
all right sections taken to the central axis of the said armature in the barrel cavity are smaller then all barrel cavity right sections and a portion of said armature sections are similar to the barrel cavity right sections in shape and slightly undersized thereof to permit unobstructed traverse of the barrel cavity by the armatures;
two barrel rails that are the power rails:
of like or similar length, located in the wall of the barrel cavity along the same length of barrel, oriented parallel the cavity central axis, located proximal to and electrically insulated from each other, and
each with a connection means at its breach end for attachment of circuitry to an outside power source and each with a continuous surface its length that is part of the barrel cavity surface and which extends the length of the barrel cavity through which an armature is propelled in the device; and

a wall conductor assembly comprised of:
a barrel bus which is located in a barrel cavity wall and therein oriented parallel, adjacent, and in close proximity one of the power rails and electrically insulated therefrom and of like or similar length and similar or like location along the barrel cavity length as said power rail, and
a plurality of equal length parallel wall conductors in the barrel cavity wall which are separated from each other in distribution along the length of the barrel bus and at or very near the barrel cavity surface, and
each said wall conductor is physically and electrically continuous with and perpendicular to the barrel bus, and each wall conductor extends from the barrel bus through the barrel cavity wall circumscribing most of the cavity to close proximity without contact with a barrel rail most distal said barrel bus, and
at the barrel cavity and proximal said barrel rail most distal said barrel bus, each wall conductor has and is electrically continuous with an electrical contact means, and
beyond the barrel bus each wall conductor is electrically insulated from its surroundings except at its electrical contact means;
said armatures are further comprised of:
a propulsion bus that, with an armature is in the barrel

cavity, is oriented therein to travel in close proximity to the wall conductors of the wall conductor assembly and carry current in a direction perpendicular to the cavity axis and parallel to the wall conductors and perpendicular to armature direction of cavity traverse and during barrel cavity traverse by the armature, and

which when in the barrel cavity said propulsion bus extends from

proximal a barrel rail located distal the wall conductor assembly barrel buss, whereat it has electrical continuity with a propulsion bus-aft shunt circuit means,

to the cavity wall surface of the power rail proximal the barrel buss where it has continuous electrical continuity with said power rail and with armature movement in the barrel cavity continuous sliding electrical continuity with said power rail, and

a forward current shunt that, with the armature in the barrel cavity,

is located forward the armature propulsion bus in the direction of cavity traverse by the armature and proximal the power rail that is located distal the wall assembly barrel bus, and

the forward current shunt has surface in the armature surface proximal the barrel cavity wall with the wall conductor contact means and

said forward shunt surface has continuous electrical

continuity with the wall conductor assembly forward wall conductor contact means and, during armature movement in the barrel cavity, said forward shunt surface has continuous sliding electrical continuity with the contact means of forward wall conductor of said assembly, and the forward current shunt, via said surface at forward wall conductor contact means, has continuous electrical continuity with the wall conductor assembly and during armature movement in the barrel cavity said forward shunt, via said surface, has continuous sliding electrical continuity with the wall conductor assembly through its continuous sliding electrical continuity with forward wall conductor contact means as said means are passing across said shunt surface, and

during barrel cavity traverse by the armature, said forward current shunt, has continuous sliding electrical continuity with the wall conductor assembly from breach to muzzle and said continuity is resultant the continuous sequential sliding electrical continuity said surface has with successive wall conductors, via their contact means, comprising forward wall conductor of the wall conductor assembly as said contact means pass across said forward current shunt surface with continuous sliding electrical continuity, as said forward current shunt passes said contact means barrel cavity location, additionally,

the forward current shunt has continuous electrical con-

tinuity with the proximal barrel power rail via a surface at the cavity surface of said rail and during armature movement in the barrel cavity the forward current shunt has continuous sliding electrical continuity with said proximal barrel power rail via said shunt surface at the cavity surface of said rail and said forward current shunt thereby maintains continuous electrical continuity between said power rail and forward wall conductor of the wall conductor assembly, and

with an armature in the barrel cavity, said forward armature current shunt, except for its continuous electrical continuity with forward wall conductor and the proximal power rail, is electrically insulated from the rest of the armature and barrel; and

an aft current shunt which, with the armature in the barrel cavity, is located aft the armature propulsion bus in the direction of cavity traverse by the armature and proximal the barrel rail that is located distal the wall assembly barrel bus, and

the aft current shunt has surface in the armature surface proximal the barrel cavity wall with the wall conductor contact means and

said aft shunt surface has continuous electrical continuity with the wall conductor assembly aft wall conductor contact means and,

during armature movement in the barrel cavity said aft

shunt surface has continuous sliding electrical continuity with the contact means of aft wall conductor of said assembly, and

the aft current shunt, via said surface at aft wall conductor contact means, has continuous electrical continuity with the wall conductor assembly and during armature movement in the barrel cavity said aft shunt, via said surface, has continuous sliding electrical continuity with the wall conductor assembly through its continuous sliding electrical continuity with aft wall conductor contact means as said means are passing across said shunt surface, and

during barrel cavity traverse by the armature, said aft current shunt, via said surface, has continuous sliding electrical continuity with the wall conductor assembly from breach to muzzle and

said continuity is resultant the continuous sequential sliding electrical continuity said surface has with successive wall conductors, via their contact means, comprising aft wall conductor of the wall conductor assembly as said contact means pass across said aft current shunt surface with continuous sliding electrical continuity, as aft current shunt passes said contact means barrel cavity location,

the claimed device also has:

a propulsion bus-aft shunt circuit means which main-

tains continuous electrical continuity between the armature aft current shunt and the armature propulsion bus; and

with an armature in the barrel cavity, said armature propulsion bus except for its said electrical continuity with the power rail proximal the barrel bus and its electrical continuity with said propulsion bus–aft shunt circuit means is electrically insulated from the rest of the armature and barrel;

with an armature in the barrel cavity, said armature aft current shunt except for its continuous electrical continuity with aft wall conductor contact means and its electrical continuity with said propulsion bus–aft shunt circuit means is electrically insulated from the rest of the armature and barrel;

and in which with an outside power source attached to the connection means of the two power rails and with an armature of the claimed device in or inserted into the breach end of the barrel cavity of said device where said power rails and wall assembly are extant, the electric current path in the device effecting electromagnetic propulsion of the armature in the barrel cavity toward the muzzle is extant and remains so while the armature is completely in the barrel cavity where said rails and wall assembly are extant;

and the magnetic fields of the electric current in forward

wall conductor and aft wall conductor of the wall conductor assembly interact with the electric current in the propulsion bus creating the forces therein with barrel cavity axis parallel, barrel muzzle directed components which propel said armature in the barrel cavity towards the muzzle.

[c20] Combinations as in claim 19 wherein , with an armature in the barrel cavity, the propulsion bus-aft shunt circuit means is comprised of:
an additional barrel rail which is located parallel to and in close proximity to the armature shunt proximal power rail, is electrically insulated therefrom, and is of like or similar length and like or similar location along the barrel cavity length as said power rail, and has continuous barrel cavity surface its length,
surface on the aft current shunt which has continuous electrical continuity with barrel cavity surface of said additional barrel rail and during armature movement in the barrel cavity said shunt surface has continuous sliding electrical continuity with the barrel cavity surface of said additional barrel rail, and
surface on said propulsion bus which has continuous electric continuity with the barrel cavity surface of said additional barrel rail and during armature movement in the barrel cavity said propulsion bus surface has contin-

uous sliding electrical continuity with the barrel cavity surface of said additional barrel rail.

[c21] Combinations as in claim 19 wherein the propulsion bus-aft shunt circuit means is an electric current bus in the armature between and connecting the armature aft current shunt and the armature propulsion bus.

[c22] Combinations as in claim 19 wherein; however: said barrel cavity has a twist so that consecutive barrel cavity right sections when taken at incremental increasing muzzle directed distances from a point at the breach on the cavity axis have like shape and area but have incremental increasing angular displacement about the cavity axis from the initial point and said right cavity section angular displacement per unit axial distance is constant and the barrel cavity thereby imparts a rotation about said axis to an armature of the device traversing said cavity; said armatures of the device and elements therein have structure and surfaces with the same twist about the armature axis as the barrel cavity twist in angle displacement per unit axial distance so as to permit proper function of its various elements while rotating about its axis while moving in the barrel cavity and unobstructed traverse of the barrel cavity by said armature while rotating about its axis; each incremental volume element at their radius to the cavity axis of the sum of the incre-

mental volume elements comprising said barrel rail, the barrel bus and wall conductor of the wall assembly have at their axial location the same angular displacement per unit cavity axis distance; wall conductors of wall conductor assembles with said twist are no longer perpendicular to the barrel bus of the assembly; however they remain perpendicular to the barrel cavity axis.

[c23] Combinations as in claim 19 but wherein an armature is mounted in the barrel proximal the barrel breach end for release and propulsion in the barrel cavity on application of sufficient power to the power rails.